

# METHOD AND NETWORK ELEMENT FOR TRAFFIC FLOW TREATMENT IN A CORE NETWORK OF A COMMUNICATION NETWORK

## TECHNICAL FIELD

[0001] Embodiments of the present invention relate generally to mobile communications and more particularly to network elements and methods in communication networks. More specifically, it relates to a method for traffic flow treatment in a core network of a communication network, network elements, a computer program product and a computer-readable medium.

[0002] In the next years a significant increase in mobile data traffic may be expected. This mobile traffic may be caused by mobile telecommunication equipment, such as laptops using dongles, smart phones and tablet PCs, for example iPads. Moreover, future applications may increase in bandwidth. Thus, there may be a need to reduce the costs per transferred bit.

[0003] Application differentiation may be one possibility for utilizing the communication infrastructure in an efficient way and to address the traffic increase considering the different Quality of Service (QoS) requirements of the applications. A further possibility may be to distinguish according to subscriber perceived service quality, for example Quality of Experience (QoE). Therefore, it could be possible that sensitive applications are scheduled with higher priority while less important traffic, for example P2P file downloading traffic may be scheduled with lower priority or may be throttled. These solutions for application differentiation may be proposed by different network vendors and may depend on the installed equipment of the Communication Service Providers (CSP).

[0004] Fluctuating capacity over the air may spoil the user experience for bandwidth sensitive applications. High volume services, such as P2P file downloading may impact negatively interactive services, such as browsing. Furthermore, in case of congested cells, the subscriber level in relation to QoS may not separate different applications within a single bearer, which may provide difficulties for an effective usage at application level.

[0005] At present these observations may occur in communication networks based on 3G/HSPA technology, where most of the mobile devices do not support a secondary PDP context. Such a secondary PDP context would enable traffic of different applications to be mapped to different bearers to which different QoS levels could be assigned.

[0006] Some of the present solutions try to detect the congestion and perform the packet treatment on RAN level. However, on RAN level the specific applications running over a single bearer as well as policies may not be known. Traffic flow identification in general may be performed in the core network by means of for example deep packet inspection (DPI). The policies are only known in the core at present, for example in a Policy and Charging Rules Function (PCRF).

[0007] There may be several approaches in order to detect and treat the traffic in the RAN. However, only few mechanisms are known that could be applied in the core network for application differentiation. Currently, the most common way of bandwidth management may be based on long-term statistics that are derived in the core network, and based on these forecasts the traffic may be treated correspondingly. For example, in busy hours it may be expected that the cells are

highly loaded or congested and all low priority traffic, such as P2P file downloading traffic may be throttled independently of whether the cell carrying this traffic is really congested at that time or not.

[0008] Other proposals for cell load detection may be based on the evaluation of Transmission Control Protocol (TCP) flow behavior, wherein a TCP may be understood as a protocol that provides the transport service located in the transport layer of the open systems interconnection (OSI) model. These approaches may be based on the typical characteristics, whereas an assumption may be made whether the cell, representing one end of one or more TCP flow(s), is congested or not.

[0009] All these proposed mechanisms may not be as accurate as measurements in the Radio Access Network (RAN) or even on cell level, and also not as fast. Finally, it is still an open question how to decide which traffic flows belong to the congested cell and which flows should be treated correspondingly, for example throttled. Thus, there may be a need to control traffic of congested cells.

## SUMMARY OF THE INVENTION

[0010] According to an exemplary embodiment of the present invention, a method for traffic flow treatment in a core network of a communication network is provided. The method may comprise receiving cell information from an access network of the communication network, wherein the received cell information comprises an indication of a congested cell of the communication network. Furthermore, the method may comprise receiving subscriber specific information comprising real-time information of a subscriber in a cell of the communication network. The method may further comprise analyzing the received subscriber specific information and controlling the traffic flow in the core network according to the analysis of the subscriber specific information.

[0011] Subscribers may be users in a communication network, utilizing user equipment, such as mobile devices, for example laptops with wireless radio connections, mobile phones, smart phones and the like.

[0012] A congested cell may be understood as a cell with a high cell load. An exemplary indication of a congested cell may be a mismatch between a requested and a provided throughput if the provided throughput is below a pre-defined minimum threshold. In a special case where the requested throughput may be below the minimum threshold, the provided throughput being below the requested throughput would be considered as an indication. Further definitions of indications and of cell congestion and of high cell load may be available and may be applicable in this context.

[0013] A congested cell may be caused for example by unfavorable radio conditions or too many users or too many services or too many resource requests or combinations thereof.

[0014] Before receiving subscriber specific information there may be provided for identifying one or more subscribers. The identification may comprise a subscriber ID. It may be foreseen to receive all subscribers IDs of the users in a congested or overloaded cell.

[0015] The received cell information may comprise an indication of a congested cell of the communication network. This cell information may originate from a RAN.